Department of Defense

Space Test Program

"Access to Space"

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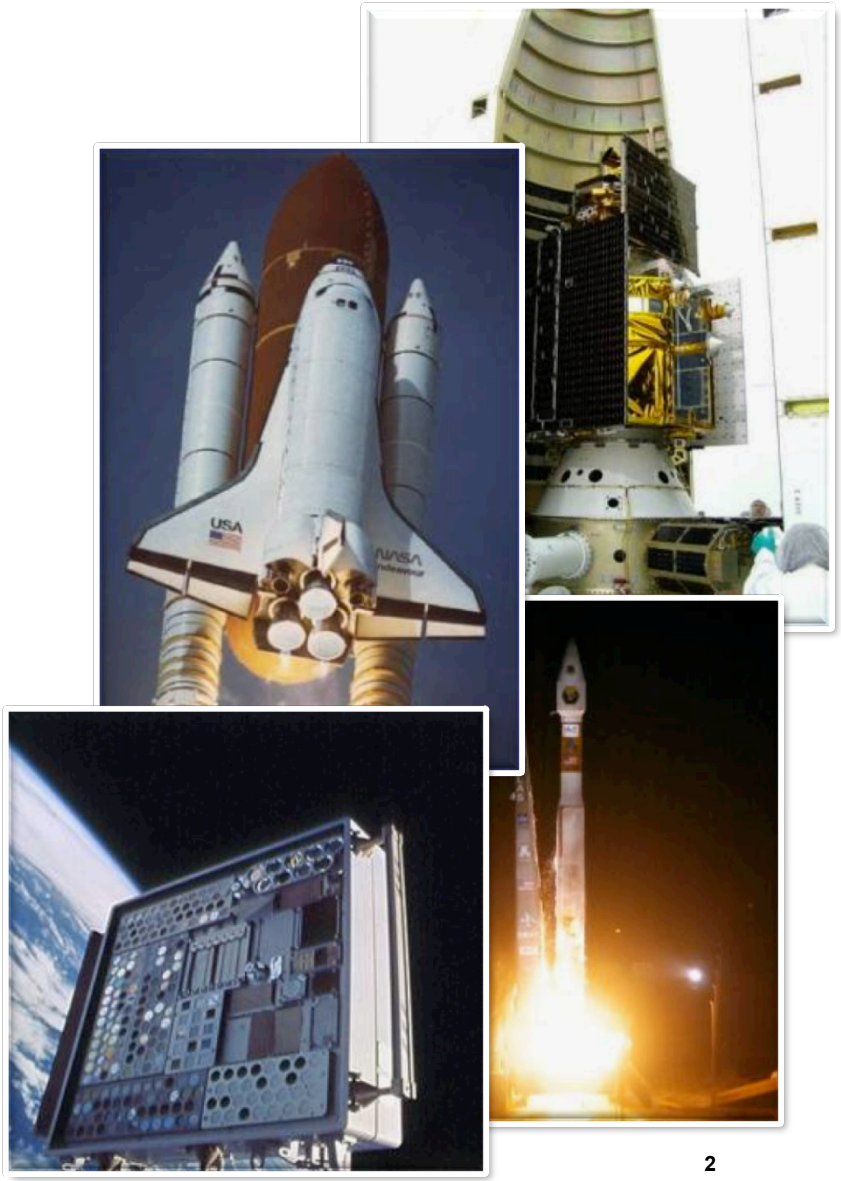
The STP Mission

- **"…provide mission design, spacecraft acquisition, integration, launch, and on-orbit operations for the maximum number of DoD… experiments, consistent with priority, opportunity. and available funding."**
  – STP Management and Funding Policy

- **"The STP has been designated as the "front door" for all DoD auxiliary payloads (APLs) on DoD, civil and commercial launches, and for all non-DoD APLs seeking launch opportunities on DoD missions."**
  – STP AFI 10-1202; AR 70-43; OPNAVINST 3913.1B

- **"single manager for all DoD payloads on the Space Shuttle, the ISS, future manned and unmanned NASA launch vehicles…"**
  – STP AFI 10-1202; AR 70-43; OPNAVINST 3913.1B



STP History

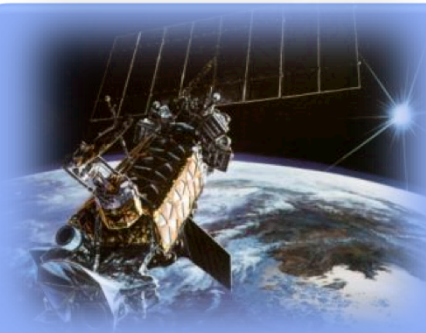
PNT
(NTS-1: 1974)

Space Control
(SOICAL-3: 1969)

Communications
(LES 6: 1968)

Missile Defense
(RM-15: 1967)

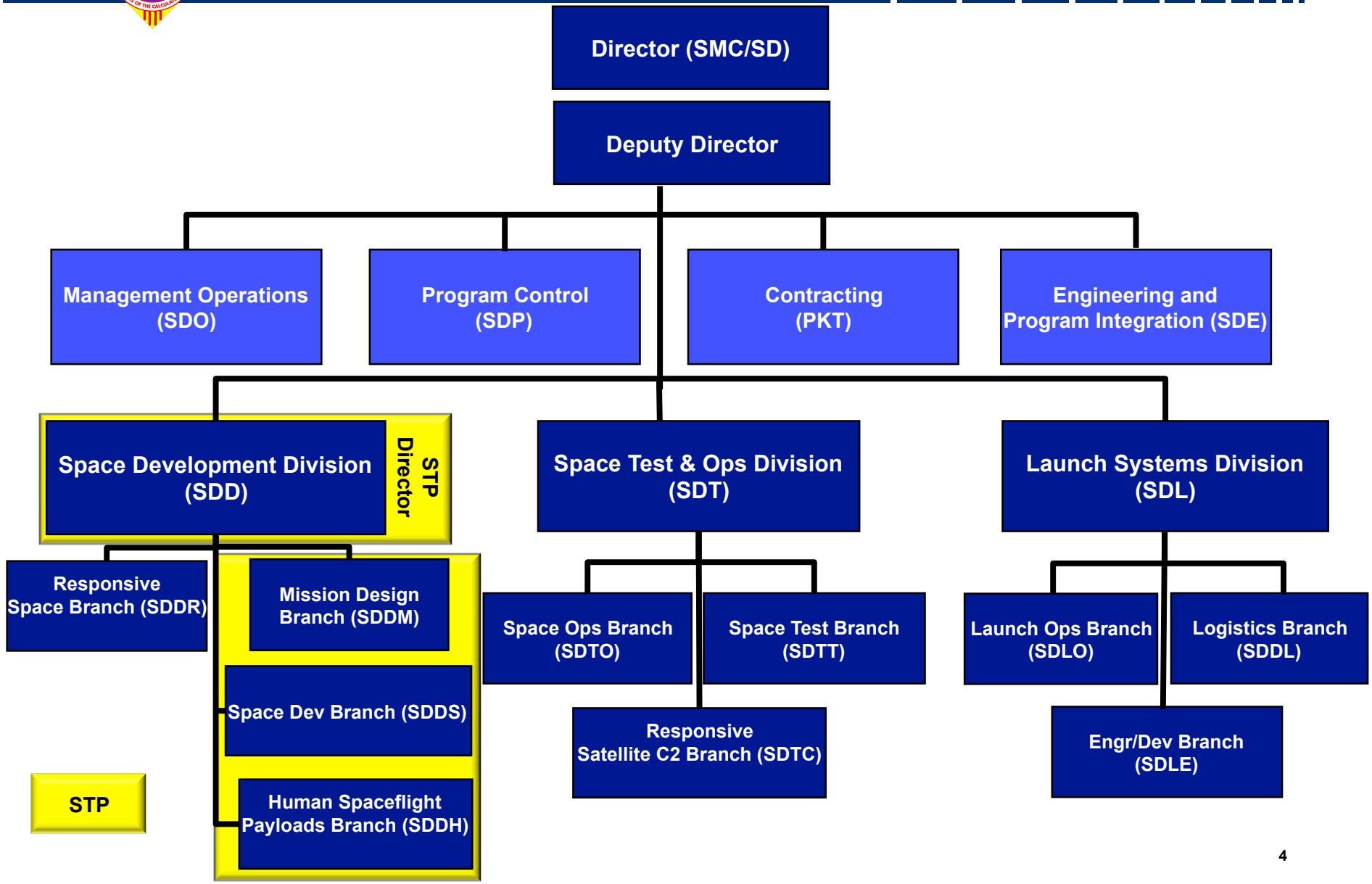
507 Experiments on
Over **212** Missions
Since 1967



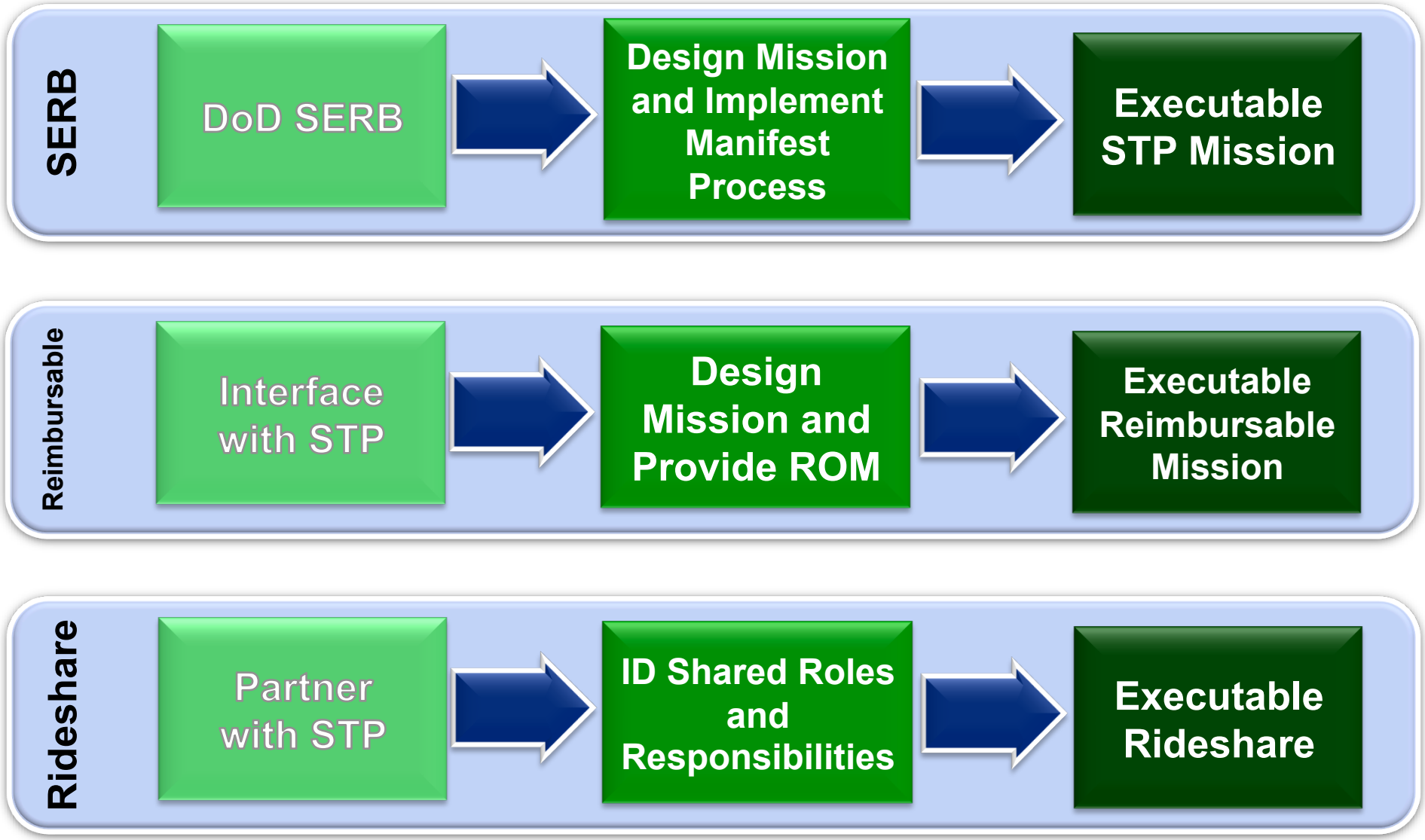
Weather
(HiLat-1983)

STP has flown and will continue to fly advanced technology leading to tomorrow's operational systems

SMC/SD Organization



Path to STP Support

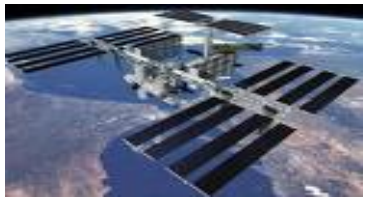


STP Access to Space

- **Spaceflight Methods:**
  - Dedicated Launches
    - ELVs, sub-orbital sounding rockets, high-altitude balloons, zero-g flights
  - Shuttle/International Space Station (ISS)/Other NASA vehicles
    - Deployables, payload bay, mid-deck lockers, ISS internal/external
  - Auxiliaries
    - Piggyback payloads: Margin on existing SC
    - Secondary SC: Margin on existing LV


Atlas V

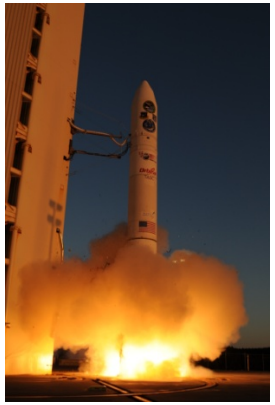

Space Shuttle


ISS


Zero G Flight


High-altitude balloon


Sounding rocket


Minotaur IV

Setting Standards through Enablers

- Proactive measures to standardize SC design & construction
  - Based on 40+ years of lessons learned
  - Cohesive approach throughout space community
    - AFRL, ARMY, DARPA, NASA, NRL, NRO, SMC, along w/contractors and universities
- STP Enablers
  - EELV Secondary Payload Adapter (ESPA) CLASS SC
    - Standard Interface Vehicle (SIV)
    - Fast Affordable Science & Technology Satellite (FASTSAT)
  - Multi-Payload Adapter (MPA) - Minotaur IV
  - Hydrazine Auxiliary Propulsion System (HAPS) – Minotaur IV
  - Poly Picosatellite Orbital Deployer (P-PODs) / CubeSat
    - Accommodations on multiple LVs/SVs, Space Shuttle
  - Multi-Mission Space Operations Center (MMSOC) GSA

Maximize Launch Opportunities using Standardization

Spaceflight Standards ("Enablers")

ESPA

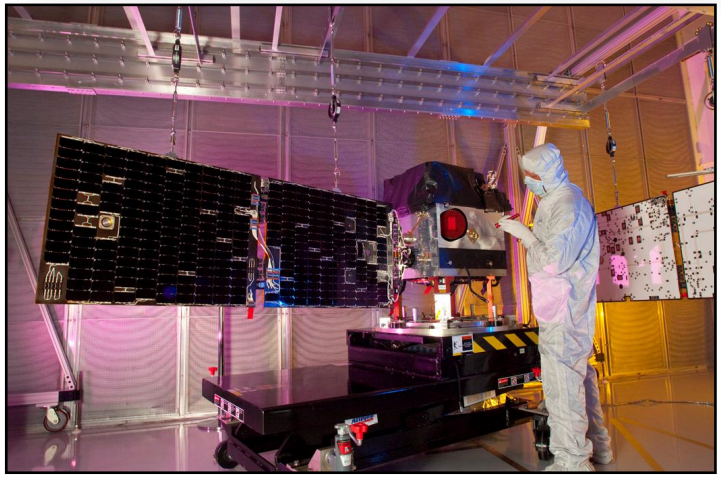
(EELV Secondary Payload Adapter)

- SC weight ≤ 180kg
- SC Volume – 35.5" x 28" x 24"
- CG Location - < 20" from the SSIP
- Mechanical Interface – 15"
- Electrical: Battery charge/monitor
- Fundamental Frequency > 35hz

SIV

(Standard Interface Vehicle)

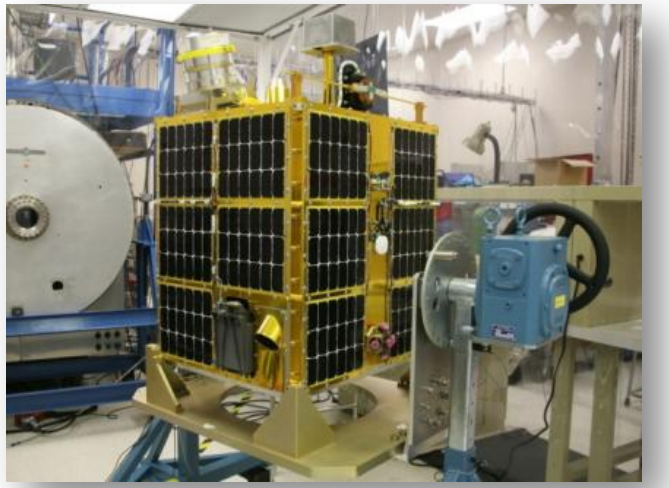
- ESPA Class SC ≤ 180kg
- 1-4 Experiments
- Heritage subsystems
- Compatible w/ multiple LVs
- Compatible w/ MMSOC & AFSCN
- Storable until launch identified



Spaceflight Standards ("Enablers")

FASTSAT: Fast Affordable Science & Technology SATellite (FASTSAT-HSV01)

- Flight of up-to 6 SERB experiments
- Sponsor: NASA MSFC
- Size: 30" x 27" x 41" tall
- Mass: 328 lbs

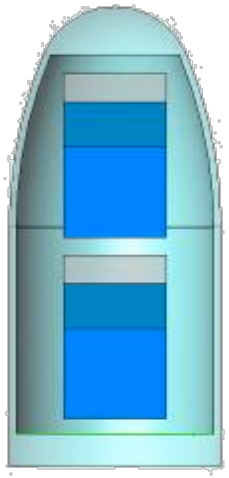


MPA

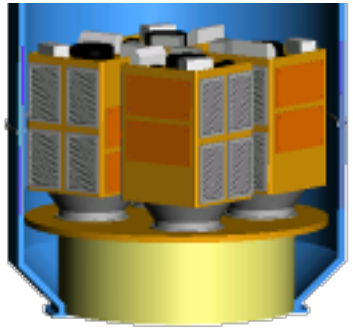
(Minotaur IV Multi-PL Adapter)

- Holds up to 4 ESPA Class SC
- Mass ≤ 180kg
- Volume – 35.5" x 28" x 24"
- Maximizes lift capability
- First demo - STP-S26 ILC May 10

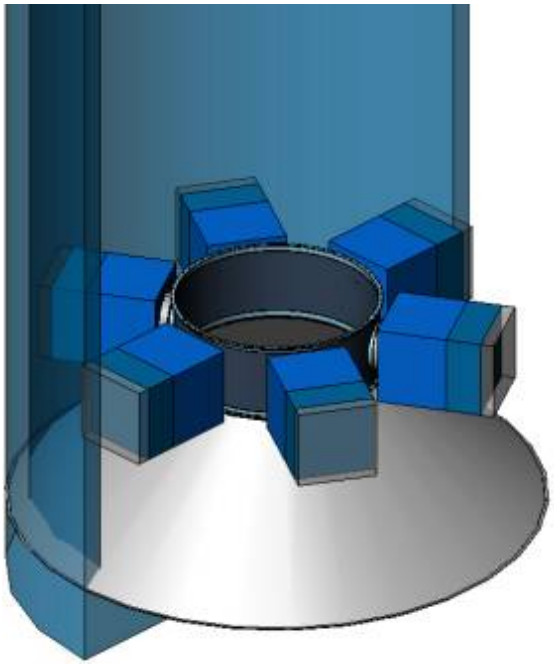
ESPA-Class Satellite Launch Vehicle Compatibility



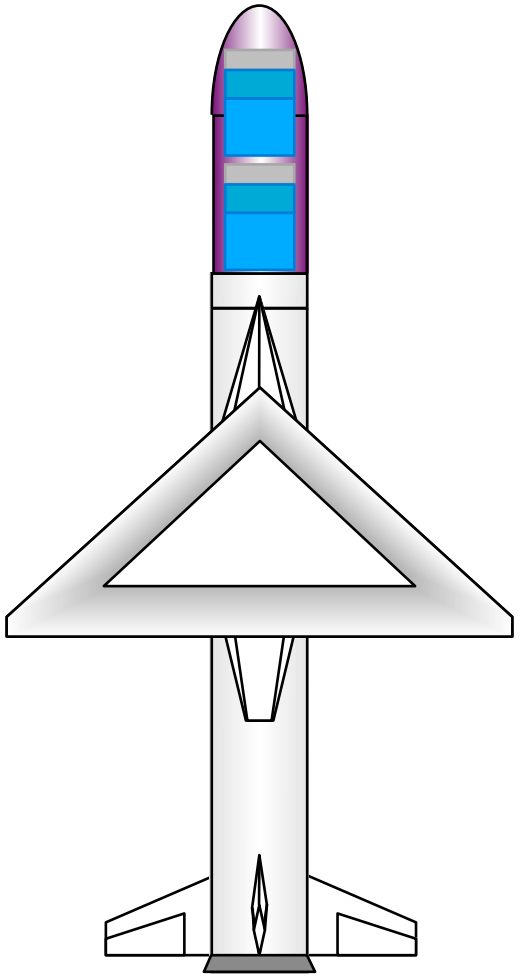
Minotaur I



Minotaur IV



EELV Medium
(Atlas and Delta) ESPA



PEGASUS

Maximize launch opportunities using 180 kg satellites & secondary adapters

Spaceflight Standards ("Enablers")

HAPS
(Hydrazine Auxiliary Propulsion System)

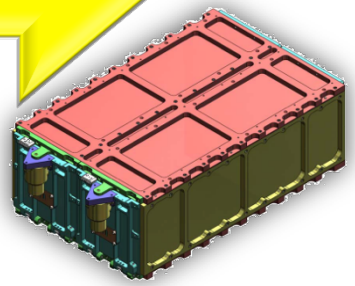
- Dual orbits from small LVs
- Precise orbit insertion
- First demo - STP-S26
  Launched 19 Nov 2010

CubeSat Deployers
10x10x10 cm cube, ~ 1 kg mass ("1U")

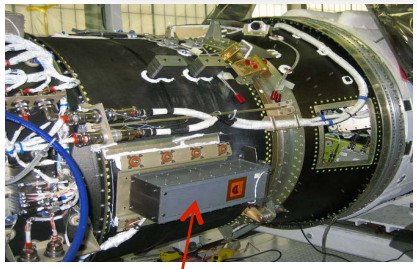
• LVs: Minotaur I, Minotaur IV, Falcon-9, Rockot, Dnepr, ISS

1 U CubeSat (Cal Poly1)

Cal Poly P-POD



NASA Ames Deployer (6U)



P-POD on Minotaur I

EELV Standard Service

- One ESPA ring to fly a year starting 2012
- Multiple ESPA class SC opportunities a year
- All APLs through STP
- Various Orbits
- Cost TBD

SECRETARY OF THE AIR FORCE
WASHINGTON

February 13, 2008

MEMORANDUM FOR AFSPC/CC

SUBJECT: EELV Secondary Payload Adapter (ESPA) Policy

The Air Force has many Evolved Expendable Launch Vehicle (EELV) missions programmed across the FYDP with anticipated excess weight margin. We should leverage this excess capacity by maximizing our use of the EELV Secondary Payload Adapter (ESPA), which was successfully demonstrated in March 2007 on STP-1. As such, it is my policy to make ESPA-hosted satellite launches a routine operation starting NLT FY12.

I would like Air Force Space Command (AFSPC) to develop an ESPA utilization plan and implementation guidance in time to support the FY10 POM. AFSPC should also continue near-term efforts to make the ESPA available as a low-cost, highly reliable, standardized service for small payloads when technically feasible and consistent with overall mission assurance.

This policy is an important milestone in our efforts to provide routine and affordable access to space for scientific, research, development, and Operationally Responsive Space (ORS) missions. I look forward to your continued support in this endeavor.

Michael W. Wynne

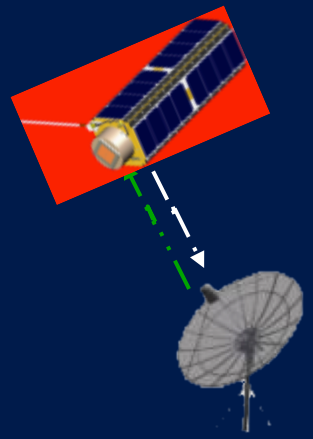
cc:
SAF/US
AFPEO/SP
AF/A3/5
AF/A8
AFRL/CC

STP Areas of Expertise: Operations

Interagency

- History of cooperative satellite ops with NASA and other gov agencies

CubeSats



- In-house CubeSat ops capability in work
- Access to multiple ground station options

End-to-End Support

- Acquisition Team Participates in Ops Rehearsals
- SCA held by STP Director
- Ground Station Developed in SMC/SD

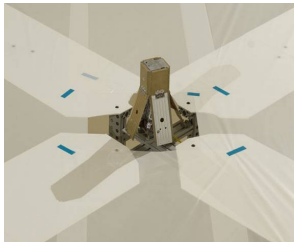
SMC/SD has the unique capability of allowing responsive, in-house access to the SC operators

CubeSats

- CubeSat Proliferation
  - 10 Countries have successfully deployed CubeSats
  - Over 250 institutions developing CubeSats, including China (Academia, Gov't & Industry)
  - Growing number of STP experiments are CubeSats or CubeSat compatible payloads
    - 2007 DoD SERB : 4 CubeSats 2 Compatible Payloads
    - 2008 DoD SERB : 7 CubeSats 6 Compatible Payloads
    - 2009 DoD SERB: 8 CubeSats 5 Compatible Payloads
    - 2010 DoD SERB: 10 CubeSats 7 Compatible Payload
- CubeSat Potential
  - Potential for operational use in many mission areas
    - SSA, SEM, ISR, and COMM
  - Several DoD agencies working to build operational missions

Directorate CubeSat Activities

- CubeSats on STP Launches
- Previously Launched: MEPSI, PSSC, GeneSat, PharmaSat
- Missions On-Orbit:
  - STP-S26: RAX, O/OREOS, Nanosail-D
- Missions selected for Manifest on CRS:
  - Tethersat, BK-1, SMDC-TechSat, GROUP-C, PSSC Testbed, TEPCE
- SDTO developing CubeSat Ground System
  - Funded by SMC/XR & STP
  - SENSE is first mission with G/S having residual capabilities for future AF CubeSat mission
- Collaborating with SMC/XR on SENSE project
  - 2 SSAEM CubeSats
  - SMC/SD to launch and operate
- STP participating member in the CubeSat Standards Committee
  - Working to develop standard integration practices and procedures



Summary

- STP has a history of creating successful collaborative missions to provide experiments and auxiliary payloads with access to space.

- Personnel at STP are experienced at developing creative and cost effective missions designed to maximize government and customer resources.

- Access to STP services either through the SERB process or as a funded reimbursable.